

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.: 08/536,345  
Filed: September 29, 1995  
Examiner: M. Dalakis  
Art Unit: 2108  
Inventors: Stephen Temple and Mark R. Shepherd  
Title: **Multi-Channel Array Droplet Deposition Apparatus**  
Assistant Commissioner for Patents  
Washington, D.C. 20231



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**APPELLANTS' BRIEF ON APPEAL**

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1.	35 USC §112, first paragraph
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3.	35 USC §103(a)

### Authorities

1.	Manual of Patent Examining Procedure, 7 <sup>th</sup> Edition, p. 2100-129, Section 2164
2.	Manual of Patent Examining Procedure, 7 <sup>th</sup> Edition, p. 800-16, Section 804

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**APPELLANTS' BRIEF ON APPEAL**

Appellants' Brief on Appeal is submitted herewith, in triplicate, along with a check in the amount of \$300 to cover the request fee. This brief is timely filed, as it is accompanied by a petition for a three month extension of time.

**I. Real Party in Interest**

The present application has been assigned to XaaR Technology, Ltd. of Great Britain. Evidence of the assignment was recorded on July 6, 1998, at Reel 9297, Frame 0570.

**II. Status of Claims**

Claims 20-33, 46-58, 65, 66, 70, 71, and 74 are presently withdrawn from consideration in this application as being drawn to a non-elected/restricted invention.

Claims 79 and 80 also stand currently withdrawn from consideration in this application as being drawn to a non-elected/restricted invention. These claims have been cancelled without prejudice in the Amendment "D" filed herewith. Claims 79 and 80

therefore will also be cancelled without prejudice if the Amendment "D" is entered.

Claims 34-45 and 59-64 are presently allowed in this application.

Claims 75-78 currently stand finally rejected under 35 USC §112 and also under 35 USC §101.

Claims 67-69, 72 and 73 currently stand finally rejected under 35 USC § 103(a).

### III. **Status of Amendments Filed After Final Rejection**

An Amendment "C" after final rejection was mailed on February 14, 2000 and was considered by the examiner. Amendment "C" has NOT been entered according to an advisory action mailed on February 18, 2000. The examiner also did NOT indicate in the advisory action the status of the Amendment "C" if a Notice of Appeal were to be filed.

An Amendment "D" after final rejection is submitted herewith in conjunction with Appellants' Brief On Appeal. The Amendment "D" has yet to be considered by the examiner.

### IV. **Summary of the Invention**

The invention is generally for an ink jet print head that includes a plurality of channels formed at a piezoelectric material that is either provided as a layer on a sheet or as a sheet. Each of the channels has opposed side walls and electrodes on each of the side walls. A top cover sheet closes off the open tops of the channels. The top cover sheet is attached to the channels by bonding the channels to the walls or to the electrodes. Conductive tracks or electrodes are provided in an array on the top cover that correspond to the channels and that overly respective ones of the channels. The electrodes on the top cover are conductively coupled to the electrodes on the walls of the channels. The electrodes are electrically actuated

in order to disburse droplets of ink from the channels as desired according to signals from an ink jet printer.

V. **Issues**

A. Whether the examiner erroneously rejected claims 75-78 under 35 USC §112, first paragraph, as being based a non-enabling disclosure.

B. Whether the examiner erroneously rejected claims 75-78 under 35 USC §101 as claiming the same invention as in claim 9 of issued and related U.S. Patent Number 5,463,414.

C. Whether the examiner erroneously rejected claims 67-69, 72, and 73 under 35 USC §103(a) as being obvious and therefore unpatentable over Temple et al. U.S. Patent Number 5,463,414 (Temple) in view of Bartky et al. U.S. Patent Number 4,992,808 (Bartky).

VI. **Grouping of Claims**

As for the rejection under 35 USC §112, claims 75-78 will stand or fall together.

As for the rejection under 35 USC §101, claims 75-78 will stand or fall together.

As for the rejection under 35 USC §103, claims 67-69, 72 and 73 will stand or fall together.

VII. **Facts**

The application at issue in this appeal was filed on September 29, 1995, as a continuation of then co-pending parent application Serial Number 08/167,894. The parent application has issued as U.S. Patent No. 5,463,414.

A first preliminary amendment, filed with the application on September 29, 1995,

essentially put the specification and claims into U.S. practice format and corrected grammar and other non-substantive informalities.

A second preliminary amendment was filed on August 28, 1996, cancelling claims 1-19 that were carried over from the original parent application and substituting new claims 20-74. The second preliminary amendment also corrected other minor informalities. Claims 67-74 were copied from a European counterpart of a U.S. application that eventually issued as U.S. Patent No. 5,598,196 assigned to Eastman Kodak (Kodak patent) and were added in order to possibly invoke an interference.

A third preliminary amendment was submitted on March 18, 1997, correcting a typographical error in independent claim 67. The third preliminary amendment also incorporated remarks discussing the Kodak patent and disclosing the prior art cited during prosecution of the Kodak patent.

A restriction requirement was mailed on April 14, 1997, restricting between apparatus and method claims in this application. Appellants elected to prosecute the apparatus claims currently at issue and elected to withdraw the method claims from consideration, but made such election *with traverse*. Appellants noted the inconsistent treatment of the apparatus and method claims of the Kodak patent and also noted the eventual interference between the Kodak patent and claims 67-74 of this application.

A first official action was mailed on January 21, 1998, rejecting the appellants' arguments regarding the restriction and further rejecting the claims. Claims 34-45 and 59-64 were rejected under §112 as containing several claim references that were determined unclear. Each of the elected claims 34-45, 59-64, 67-69, 72 and 73 was also rejected under §103(a) as being unpatentable or over Temple in view of Bartky.

A first continuation application was filed on June 22, 1998. A first official action was

mailed on August 13, 1998, restating both of the claim rejections as set forth in the previous action.

An amendment after final rejection was submitted on September 14, 1998, amending independent claims 34 and 59 in order to clarify these independent claims and to traverse the §112 rejection. Remarks were also presented traversing the rejection of all pending claims under §103 over Temple in view of Bartky.

An advisory action was mailed on September 29, 1998, indicating that the proposed amendment was considered but would not be entered because it raised issues requiring further consideration and/or search after final.

A second continuation application was submitted on January 29, 1999, requesting that the previous amendment be entered and considered. A first official action was mailed on April 13, 1999, allowing claims 34-45 and 59-64. Claims 67-69, 72, and 73 remained rejected over Temple in view of Bartky.

An Amendment "B" was mailed on July 13, 1999, adding new claims 75-80 and traversing the previous rejections. Claims 75-80 are worded similarly to allowed apparatus claim 9 in the parent issued 5,463,414 patent, but include additional language directed to unclaimed aspects of the invention. Appellants further provided remarks traversing the rejections, and particularly the rejection of claims 67-69, 72, and 73 over Temple in view of Bartky.

A final official action which resulted in this appeal was mailed on September 27, 1999, again rejecting claims 67-69, 72 and 73 and rejecting claims 75-78 for the first time. The final action also noted that newly added claims 79 and 80 were dependent from a non-elected claim 20 and therefore the examiner withdrew these claims from consideration. Claims 75-78 were rejected under §112 for reciting limitations that are allegedly not enabled



in the specification. Claims 75-78 were also rejected on double patenting grounds under §101 as claiming the same invention in claim 9 of the prior parent 5,463,414 patent. Each of these rejections was raised for the first time in this final official action. Claims 67-69, 72, and 73 were again rejected under §103 over Temple in view of Bartky.

Appellants submitted an Amendment "C" after final rejection on February 14, 2000, amending claims 79 and 80 to correct an obvious typographical error of claim dependency. It was noted that these claims should have been dependent from the new claim 75 instead of the withdrawn claim 20. Appellants also presented argument and evidence regarding the §112 rejection of claims 75-78 to the effect that these claims are enabled and supported by the specification as originally filed. Appellants further presented argument and evidence regarding the §101 rejection that new claims 75-78 did not in fact claim the same subject matter as recited in claim 9 of the parent 5,463,414 patent. Appellants also presented additional, more detailed argument discussing the differences between claims 67-69, 72, and 73 and the cited Temple and Bartky references.

An advisory action was mailed on February 18, 2000, indicating that the examiner had considered but did not enter the Amendment "C" after final rejection. The examiner's reasons were that there was no convincing showing under 37 CFR §1.116 why the proposed amendment was necessary and was not earlier presented and also that the amendment presented and amended additional claims (claims 79 and 80) without cancelling a corresponding number of finally rejected claims, since the examiner had already withdrawn claims 79 and 80.

In order to preserve pendency of this application and to address the issues noted above, Appellants submitted a notice of appeal on February 28, 2000, which was received in the Patent Office on March 2, 2000.

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## VIII. Argument

### A. **Erroneous Non-enabled Disclosure Rejection of Claims 75-78 Under 35 USC**

#### **§112**

Pending claims 75-78 were rejected under §112, first paragraph, as being based on a non-enabling disclosure. This rejection and this issue was raised for the first time in the final official action that resulted in this appeal.

A rejection under §112, first paragraph, based upon non-enablement, requires a showing that the specification does not adequately describe how to make and/or use and/or practice the invention as claimed. The standard for determining enablement was set out by the U.S. Supreme Court in *Mineral Separation v. Hyde*, 242 U.S. 261 (1916). The standard is generally: is the experimentation that is necessary to practice and carry out the invention considered undue or unreasonable? *Mineral Separation* at 270. This standard is still to be applied today. *In re Wands*, 858 F.2d 731,737, 8 U.S.P.Q.2d 1400,1404 (Fed. Cir. 1988). A number of different ways have been utilized to determine the meaning of undue experimentation that generally depend on the circumstances. For this appeal, we need not explore the various ways because the examiner did not even allege in the final official action that the specification is inadequate in any way for showing one of ordinary skill how to practice the invention. In contrast, the examiner alleges that the specification as filed cannot support claims 75-78 that were added by amendment because the claimed subject matter was allegedly not previously disclosed. This is not a proper allegation for raising a §112, first paragraph, rejection based upon a non-enabling disclosure.

The rejection of claims 75-78 under §112, first paragraph, is erroneous for two reasons. First, the rejection under §112 is improper because it is a rejection erroneously based upon enablement without meeting the minimum standard necessary to support such a

rejection. The enablement requirement of §112, first paragraph, is separate and distinct from the written description requirement. *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563, 19 U.S.P.Q.2d 1111, 1116-1117 (Fed. Cir. 1991). A newly added claim limitation can be enabled by, though not supported in, a written description. See Manual of Patent Examining Procedure, 7<sup>th</sup> Edition, p. 2100-129, Section 2164.

The examiner here has alleged only, and incorrectly, that *no support* can be found within the written description for the newly added subject matter of claims 75-78. The examiner has failed to allege why or how the newly added claim limitations are *not enabled*. The examiner's rejection is therefore *prima facie* erroneous because he has not alleged even the minimum standard necessary for raising the rejection under §112, first paragraph, based on non-enablement. The examiner has not alleged that one of ordinary skill would require undue experimentation in order to practice the invention recited in claims 75-78.

Second, and with that in mind, the rejection under §112, first paragraph, is erroneous in fact. Independent claim 75 recites a multi-channel array droplet deposition apparatus that has a layer of piezoelectric material and an array of parallel, open-topped droplet liquid channels in the layer. The liquid channels are provided by upstanding walls formed in the layer. Electrodes are provided on surfaces of the walls and a channel closure sheet is bonded to the walls. The apparatus includes nozzles respectively communicating with the channels and as a transverse duct for a supplying droplet fluid to the channels. A defining surface of the transverse duct has an array of parallel conductive tracks that are spaced at intervals corresponding to the channel spacing. Each track is electrically connected to the electrodes. The defining surface is comprised of a glass or a material other than the piezoelectric ceramic material.

Ample support for each of these claim elements can be found in the specification and

drawings as filed. Particularly, support for much of independent claim 75 can be found in original claim 9, page 6, lines 14-16, and in Fig. 1 of the originally-filed specification. Additional support for these claims can be found at page 4, line 21 - page 5, line 3 of the specification. Further support for these claims can be found in the specification at page 5 and in Fig. 2. The piezoelectric layer, liquid channels, cover sheet, upstanding walls, wall electrodes, nozzles, the transverse duct, the conductive tracks, the track spacing, the electrical connection of tracks and wall electrodes are each clearly and amply described throughout the specification.

As a result, the examiner pointed to specific language in making the non-enablement rejection. The examiner pointed to the “transverse duct having an array of parallel conductive tracks spaced at intervals corresponding with the channel spacing.” However, immediately subsequent to the quoted text, the claim also recites the words “a defining surface of said,” wherein the entire limitation should properly be read as “*a defining surface of said transverse duct having an array of parallel conductive tracks spaced at intervals corresponding with the channel spacing.*”

At page 5, lines 24 to the end of the page, the specification reads “a substrate or channel closure sheet 14. The substrate has parallel conductive tracks 16 formed thereon at the same pitch interval as the ink channels.” The substrate noted in this portion of the text is a “defining surface” that carries the tracks. The nature and spacing of the tracks clearly describes that the tracks correspond to the spacing of the ink channels.

Additional support is found in the drawing figures 1 and 2. Particularly, as stated at page 5, lines 6-10 of the specification, Fig. 1 is a longitudinal section of a droplet deposition apparatus and Fig. 2 is a section in the array direction taken along the line X-X of Fig. 1. Referring to Figs. 1 and 2 clearly shows that the substrate or sheet 14 is a closure for the

transverse duct 26 as well as the open ends of the channels. These figures also show that the duct 26 is arranged transverse to the channels identified as channels 11a-h. Fig. 1 only shows one conductive track 16 because this figure is a longitudinal section along the channels and tracks. Fig. 2 shows a track 16 corresponding to each channel 11. Inevitably, the tracks 16 are arranged at intervals corresponding with the channel spacing as is clearly shown in these drawings.

Referring again to Fig. 1 and as explained above, the substrate 14 or channel closure sheet forms a defining surface of the transverse duct 26. It is this same surface that carries the conductive tracks 16. Therefore, Figs. 1 and 2 also illustrate the language particularly addressed by the examiner in the final official action. Claim 75 and each of its elements is described in the text of the specification and shown in the drawing figures. The application as originally filed therefore enables claim 75 and provides adequate support in the written description for claim 75. The §112 rejection of independent claim 75 is erroneous for this additional reason.

Claims 76-78 depend from independent claim 75 and merely limit characteristics of the recited defining surface. In particular, the limitations specified in claims 76-78 are found in originally filed claim 17 reciting elastic modulus and expansion coefficient characteristics in and originally filed claim 18 reciting borosilicate glass. If subject matter is found only in one or more originally filed claims and not in the written description, the subject matter is considered to be adequately disclosed and can even be added to the specification by amendment. *In re Benno*, 768 F.2d 1340, 226 U.S.P.Q. 683 (Fed. Cir. 1985). However, further support under the present circumstances can also be found in the original description at page 10 in the third paragraph. This portion of the specification discusses each limitation noted in claim 76-78 including the elastic modulus comparison as in claim 76, the expansion

coefficient matched to silicone as in claim 77, and the borosilicate glass of the defining surface as in claim 78. The §112 rejection of dependent claims 76-78 is erroneous for this reason as well.

The §112 amendment based on a non-enabling disclosure is erroneous because the examiner failed to meet a minimum burden of proof standard such as an allegation of required undue experimentation to practice the invention. The rejection under §112 is also erroneous because the originally filed specification provides ample enabling support for each limitation of claims 75-78. The rejection under §112 of claims 75-78 should be withdrawn.

#### **B. Erroneous Double Patenting Rejection of claims 75-78 Under 35 USC §101**

A proper statutory double patenting rejection under § 101 requires that the rejected claims essentially recite the *same invention* that is claimed in an issued patent. 35 USC §101. This means that the invention claimed in an application must be drawn to the **identical** subject matter claimed in the issued patent. *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1984); *In re Vogel*, 422 F.2d 438, 164 U.S.P.Q. 619 (CCPA 1970). A statutory double patenting rejection is valid where the only difference between the claims at issue is that they are worded slightly differently but mean the same thing. See Manual of Patent Examining Procedure, 7<sup>th</sup> Edition, p. 800-16, Section 804. A statutory §101 rejection will not stand, however, when the limitations differ between claims. For example, if a claim of the application is infringed by a given product, but a corresponding claim of the patent is not infringed by the same product, the claims do not recite identical subject matter and the rejection is improper. *In re Vogel*.

In the present application, claims 75-78 stand rejected under §101 as claiming the identical subject matter recited in claim 9 of co-owned U.S. Patent Number 5,463,414 (the '414 patent). The instant application under appeal is a continuation of an application that

resulted in the '414 patent. It is therefore likely, and in fact expected, that some similarity of claim language can occur. However, in order for the §101 double patenting rejection to stand, claims 75-78 must either recite exactly the same elements as recited in claim 9 of the '414 patent or, at least recite the same subject matter but described in slightly different words. The rejection is erroneous if substantial limitations differ between claim 9 of the '414 patent and claims 75-78 at issue here. We only discuss the essential differences in this brief.

A number of differences between the two claims are noteworthy. For example, claim 9 recites a limitation of poling direction that is not found anywhere in independent claim 75. Claim 9 recites a channel closure sheet that is not found anywhere in independent claim 75. Claim 9 recites particular limitation as to the positioning of the tracks with respect to the channels wherein this limitation is not found anywhere in independent claim 75. Further, claim 9 recites a mechanical bond formed between the conductive tracks and the wall electrodes which is also not found anywhere within independent claim 75. In addition, claim 9 recites a sealing closure to the closure sheet which cannot be found anywhere in claim 75 because no closure sheet is recited therein. Therefore, in many respects, rejected independent claim 75 is broader than claim 9 of the '414 patent because of these substantial and distinct differences.

To illustrate, a number of product embodiments can exist that would infringe claim 75 of the application, but would not infringe claim 9 of the '414 patent. A product could lack any one or more of the above noted limitations, such as the specific poling direction recited in claim 9, and still infringe claim 75 without infringing claim 9. This is clear evidence of an improper same invention type statutory double patenting rejection.

Claim 75 also recites a number of limitations that are not found anywhere within claim 9 of the '414 patent. The language recited by the examiner under the non-enabling



rejection, “... said defining surface comprising a glass or ceramic other than said piezoelectric ceramic”, is not found anywhere within claim 9 of the ‘414 patent. In addition, the recitation of “a defining surface of said transverse duct having an array of ... channels” is also not found anywhere within claim 9 of the ‘414 patent. Claim 9 recites no defining surface and recites no transverse duct, but instead more narrowly recites only that the conductive tracks are on the closure sheet. Clearly, these two recitations of claim 75 when compared to claim 9 of the ‘414 patent are distinctly different.

Each of these substantial differences renders the rejection of claims 75-78 under §101 erroneous. The subject matter as recited in rejected claim 75 and claim 9 of the ‘414 patent are substantially different resulting in claims of substantially different scope. Therefore, claim 9 of the ‘414 patent and claims 75-78 do not recite “identical subject matter” as is required for such a rejection. The §101 rejection is erroneous and therefore should be withdrawn.

### **C. Erroneous Rejection of Claims 67-69, 72 and 73 Under 35 UCS §103**

Claims 67-69, 72, and 73 were rejected under §103(a) as being obvious and therefore unpatentable over Temple and further interview of Bartky. To establish a proper rejection under §103(a) by combining these two references requires that three criteria be met. First, there must be some suggestion or motivation, either in the cited references or in the knowledge available to those of ordinary skill in the art, to modify or combine teachings of the references. Second, there must be a reasonable expectation to succeed in achieving the combined teachings. Third, the combination of references must teach all the limitations of the rejected claims. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Appellants position here is that Temple and Bartky, taken alone or in combination, fail to

teach all the elements or limitations of rejected claims 67-69, 72, and 73.

The examiner's position is that Temple teaches a high density, multi-channel array, electrically pulsed droplet deposition apparatus comprising a plurality of modules that each include a layer of piezoelectric material poled normal thereto, a channel for ink droplets, separating walls, electrodes, a channel closure sheet, a nozzle plate and a means for supplying liquid to the channels. The examiner's position is further that Bartky teaches a multi-channel array comprising a plurality of modules including a channel and separating walls wherein separating wall surfaces have electrodes that cause the wall to eject droplets upon shearing, a channel cover sheet having electrodes opposite the channel, drive circuits connected to electrodes, and a manifold.

The examiner states that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Bartky into those of Temple, for the motivation, as suggested by Bartky, of providing an ink jet actuator having improved efficiency. The examiner makes no particular reference to any portion of either Temple or Bartky for support of these ascertains and further makes no comparison to the rejected claim language. The examiner further fails to mention whether Temple or Bartky disclose certain key aspects of claims 67-69, 72 and 73. This rejection is first recited in the official action of January 21, 1998, and reiterated without variation in the further official actions of August 13, 1998, and April 13, 1999, and also in the final official action of September 27, 1999.

In the Amendment "C" submitted on February 14, 2000, Appellants, in contrast to the examiner's characterization, reiterated that Temple discloses a high density multichannel array, electrically pulsed droplet deposition apparatus, but *does not disclose* any bonds such as solder or solder joints between any portion of the piezoelectric material, separating walls,

electrodes, channel closure sheet, and/or the nozzle plate. Appellants also reiterated that Bartky teaches a multi-channel array, but *does not disclose* a channel cover sheet having electrodes opposite the channel. Appellants further argued previously that neither Temple nor Bartky discloses *a top cover sheet that has conductors or electrodes opposite or facing the channels*. Appellants have also previously argued that neither Temple nor Bartky could possibly be read to disclose that electrodes or conductors on a top cover sheet are soldered to the electrodes within the channels arranged on the opposite sidewalls of the channels.

Independent claim 67 and independent claim 72 of the application are worded slightly differently but essentially recite a top cover or top sheet of insulating material arranged over the open topped channels wherein the top cover or sheet includes a plurality of conductors or electrodes that are aligned with the open tops of the channels. The electrodes or conductors on the top cover or sheet are connected to the electrodes within the channels along the channel sidewalls by solder or solder joints. The solder or solder joints bond the top cover or sheet to the channels. These points have been previously raised before the examiner during prosecution. Such a construction is not taught by Temple or Bartky, either alone or in combination.

To further emphasize this point, Temple specifically teaches only a high density array print head for ink jet printing including a plurality of parallel ink channels. Each channel 12 is defined by a pair of side walls 16 and a bottom surface 18. The channels 12 are open topped and in the print head are closed by a top sheet 20 of insulating material. This construction is described at column 3, lines 4-22, and shown particularly in Fig. 2. The top sheet is recited as being disposed parallel to the bottom surfaces 18 of the channel and being bonded by a bonding layer 21 to the top surfaces or tops 22 of the walls 16. The channels 12 are further recited as being lined with a metalized electrode layer 24 on the sidewalls and

bottom surfaces. Nowhere within the disclosure of Temple is any teaching of suggestion made of applying or providing conductors or electrodes on the top sheet 20. Further, no suggestion is made to provide such conductors or electrodes on the top sheet that are arranged corresponding to and parallel with the opened topped channels. Further, no suggestion or teaching is provided within Temple that would lead one of ordinary skill in the art to provide such electrodes or conductors on the top sheet and to bond such electrodes of the top sheet to the sidewall electrodes of the channels. Further, Temple fails to teach or suggest any solder type bond for such a construction.

Similarly, Bartky discloses only a number of embodiments of an ink droplet print head. In each embodiment, the print head includes one or more channels extending between a base wall and a cover wall. Figs. 1(b) and 1(c) disclose a single channel print head wherein electrodes 38 and 39 are provided on the sidewalls of the channel. The top wall 22 and this embodiment does not include any conductor or electrode that in any way communicates with or is bonded to the side wall electrodes 38 or 39.

Figs. 2-7 in Bartky disclose additional embodiments each having a base wall 20 and a cover wall 22 with one or more channels lying between them. In each embodiment, the channel walls include electrodes. However, each of these embodiments of the Bartky reference fails to disclose any conductor or electrode carried on the top cover 22, and further fails to disclose such top cover electrodes that are in any way coupled to or bonded to the side wall electrodes of the channels.

The electrodes in Bartky are electrodes 38 and 39 in Fig. 1 and described at column 4, lines 48-49; electrodes 58 and 59 in Figs. 2 and 3 and described in column 6, line 40; upper and lower electrodes 68, 69 and 68' in Fig. 4 and described at column 7, lines 3-4; and electrodes 403, 404, 405 and 406 in Fig. 5 and described at column 7, lines 20-22.

Figs. 9 and 10 of the Bartky reference show additional embodiments which also fail to disclose electrodes or conductors on a top cover as discussed above. Electrodes 619 and 621 are recited as being applied to the actuator wall surfaces of a print head 600. The electrodes 619 and 621 are discussed at column 9, lines 3-5 and the walls 601 and 602 are described column 8, lines 60-61. In addition, the construction of the embodiment of Figs. 9 and 10 is described beginning at column 9, line 31.

The specification of Bartky recites that the "printhead 600 is manufactured by first laminating pre-polled layers of piezoelectric ceramic to basin top walls 601 and 602, the thickness of these layers equating to the height of the wall parts 605-607. Parallel grooves are next formed by cutting ... at the spacings dictated by the width of the channels 613 and spaces 615 ... the electrodes are next deposited ... on the surfaces of the polled wall parts ... and the wall parts 605, 607 are cemented together to form the channel 613 and spaces 615". The channels 613 and 615 are therefore formed by cementing two essentially symmetrical and mirror image components 601 and 602 together by cementing the facing top surfaces of the one-half height walls 605 and 607 to one another. The particular construction of electrodes 619 and 621 is described at column 8, line 60 to column 9, line 17. At no point does Bartky disclose, teach or suggest a top wall 602 or even a bottom wall 601 having electrodes or conductors that correspond to open ends of the channels. Further, no such conductors or electrodes are taught or suggested which could then be bonded or be soldered to the electrodes 619 and 621. Bartky further fails to disclose any soldering technique for coupling a top cover 602 or bottom wall 601 to any other portion of the print head including the electrodes 619 and 621.

The teachings of Temple and Bartky, either taken alone or in combination, clearly do not teach or suggest essential claim limitations of independent claims 67 and 72. Particularly,

claims 67 recites “a top cover of *insulating material having a pattern of parallel metal conductors aligned with the open tops of said channels* and extending beyond said body in a direction parallel with said channels.” Claim 67 further recites that “said top cover being attached to said body *by solder joints between said conductors and said electrodes*, and wherein said conductors provide electrical contact to said electrodes.” Similarly, claim 72 recites “a top sheet of insulating material having a pattern of *parallel top electrodes formed thereon, said top electrodes being aligned with and facing the tops of said channels*.” Claim 72 further recites the top sheet “*being attached by solder to said side electrodes to attach said top sheet to said print head and to close said channels at the tops thereof*.”

The rejection of independent claims 67 and 72 based upon the combined teachings of Temple and Bartky is erroneous. The above-noted limitations in each of independent claims 67 and 72 are clearly not taught or suggested within either Temple or Bartky. The combination of the two disclosures therefore fails to teach or suggest every element of claims 67 and 72. The references therefore cannot obviate either of independent claims 67 or 72.

Claims 68 and 69 depend from independent claims 67 and inherently include all of its limitations including those noted above. These claims therefore have also been erroneously rejected over the cited art combination. Similarly, dependent claims 73 depends from independent claim 72 and therefore inherently includes all of its limitations including those discussed above. Claim 73 has therefore also been erroneously rejected over the cited art combination.

The rejection of claims 67-69, 72, and 73 under §103(a) is erroneous. Claims 67-69, 72, and 73 therefore should be allowed and the erroneous rejection be withdrawn.

## IX. Conclusion

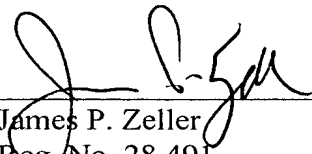
For the foregoing reasons, the appellants assert that the rejection of claims 75-78 under 35 USC §112, first paragraph, is erroneous and request that the rejection should be withdrawn. The appellants further assert that the rejection of claims 75-78 under 35 USC §101 is erroneous and request that the rejection should be withdrawn. Upon withdrawal of these rejections, appellants respectfully request that claims 75-78 be allowed. Claims 75-78 are clearly supported by the written description as originally filed and are substantially different than claim 9 of the '414 patent.

Also for the foregoing reasons, appellants assert that the rejection of claims 67-69, 72, and 73 under 35 USC §103(a) is erroneous and request that the rejection should be withdrawn. Upon withdrawal of the rejection, the appellants respectfully request that claims 67-69, 72, and 73 be allowed. The cited combination of Temple in view of Bartky clearly does not teach or suggest the invention of claims 67-69, 72, and 73.

Respectfully submitted,

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## APPENDIX

67. A piezoelectric ink jet print head, comprising;

a) a body of piezoelectrical material having a plurality of parallel open topped channels separated by walls, said walls having metal electrodes on opposite sides thereof to form shear mode actuators for effecting droplet expulsion from the channels;

b) a top cover of insulating material having a pattern of parallel metal conductors aligned with the open tops of said channels and extending beyond said body in a direction parallel with said channels; and

c) said top cover being attached to said body by solder joints between said conductors and said electrodes, and wherein said conductors provide electrical contact to said electrodes.

68. The apparatus claimed in Claim 67, wherein said electrical conductors and electrodes comprise nickel and said solder joints comprise an alloy of indium.

69. The apparatus claimed in Claim 67, further comprising an orifice place over one end of said channels for ejection of droplets of ink therefrom.

72. A peizoelectric ink jet print head, comprising:

a) a sheet of piezoelectric material poled in a direction normal to said sheet and defining a plurality of parallel channels mutually spaced in an array direction normal to the length of said channels, each channel being defined by facing side walls and a bottom surface



extending between the respective side walls, each of said side walls including side electrodes on opposite sides thereof to form shear mode actuators for effecting droplet expulsion from the channels, each said electrodes extending along the length of the corresponding side wall; and

b) a top sheet of insulating material having a pattern of parallel top electrodes formed thereon, said top electrodes being aligned with and facing the tops of said channels, and being attached by solder to said side electrodes to attach said top sheet to said print head and to close said channels at the tops thereof.

73. The apparatus of Claim 72, wherein said top sheet and top electrodes extend beyond said sheet piezoelectric material in a direction parallel to said channels.

75. A multi-channel array droplet deposition apparatus comprising a base sheet having a layer of piezoelectric material; an array of parallel, open-topped droplet liquid channels in said base sheet layer provided by upstanding walls formed in said layer; electrodes provided on surfaces of the walls; a channel closure sheet bonded to the walls; nozzles respectively communicating with the channels and a transverse duct for supplying droplet fluid to the channels; a defining surface of said transverse duct having an array of parallel conductive tracks thereon spaced at intervals corresponding with the channel spacing, each track being electrically connected to said electrodes; said defining surface comprising a glass or ceramic other than said piezoelectric ceramic.

76. Apparatus as claimed in claim 75, wherein said glass or ceramic has a relatively high elastic modulus compared with that of the piezoelectric material.

77. Apparatus as claimed in claim 76, wherein said glass or ceramic has an expansion coefficient matched to that of <110> silicon.

78. Apparatus as claimed in claim 77, wherein said glass or ceramic is borosilicate glass.